

In order to elucidate this divergence in the effect produced under as nearly as practicable similar circumstances upon mica mill-wheels on the one hand, and aluminium wheels on the other, further research seems necessary, but it would appear very probable that the heat insulating properties of mica, which would enable the two sides of a vane of this material to remain at widely different temperatures, and the high conductivity of aluminium for heat, which would not allow of such temperature differences, have an important bearing on this question.]

The Distribution of Blue and Violet Light in the Corona on August 30, 1905, as derived from Photographs taken at Kalaa-es-Senam, Tunisia.

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(Abstract.)

Nine photographs of the corona are available for discussion. They were all taken with the same instrument on the same plate (the two halves of a whole plate placed end to end) and developed in the same tray. A strong developer was used so as to produce as much contrast as possible. The plate had been exposed and moved onwards 1 or 2 inches after each exposure by an automatic device governed by a pendulum clock which closed and opened two electric circuits at specified intervals. The operator merely started the pendulum of the clock at the beginning of totality and the photographs were taken without further interference on his part. There are five exposures of 0·85 second, and one each of 9, 3, 89, 21, and 46 seconds duration. Owing to damage done in transit to the mechanism which propels the plate, the 3 seconds' exposure is partly superposed on the images belonging to those of 9 seconds and 89 seconds, with the result that only the sum of the exposures belonging to these two photographs is accurately known. This failure has somewhat complicated the reduction of the plates. During the first four exposures of 0·85 second the aperture of the lens was reduced respectively to 0·05, 0·09, 0·2, 0·4, of its area by screens, each of which had 13 equal openings distributed over the area of the lens. The effect due to diffraction produced by the screens is investigated in the

paper. The observations made on the photographs and utilised in this paper, consist in the selection of points on the several corona-images at which the photographic film shows the same degree of blackness, and in the measurement of their distance from the lunar disc. For instance, the first five photographs show the same degree of blackness at distances from the sun's limb of 0.063, 0.096, 0.139, 0.187, 0.263, respectively (unity = 10^{-3} solar diameter). The measurements were actually made on positives which showed the corona as a transparent ring round the lunar disc, and not one but 24 points of an equal-blackness curve were measured. For the first five photographs the intensities of the corona at points where there is equal blackness are inversely as the areas of the exposed portions of the lens, while for the photographs taken at full aperture the intensity is a function of the duration of exposure, which function was determined from experiments. A complication arises from the fact that the intensity of the light diffusely reflected by the sky and various parts of the instrument is of the order of the intensity of the outlying coronal radiations. The observations thus give for a series of pairs of points whose distances from the moon's or sun's limb are known, the ratio of the intensities of light, and the problem is to represent the intensity as a function of the distance of the point from the sun's limb. The calculation was carried out only for the average distance of an equal-blackness (*i.e.*, intensity) curve, and the result is that the intensity of the corona decreases inversely as the fourth power of the average distance of the curve from a circle which is concentric with the sun's disc and whose diameter is about three-quarters of the solar diameter. The formula does not hold good in each of the 24 radial directions.

I have further attempted to refer the intensity to that of a certain region on the moon, utilising photographs of the moon which were taken at the Observatory after my return from the eclipse expedition. The object of the final sections of the paper is to show that such photographs as used here, if taken on ordinary plates and plates sensitised for red and yellow rays, would be well suited for settling the debated question whether or not the luminosity of the corona is actually caused by particles heated to luminescence by solar radiation.
